Hardware Supported Cybersecurity for IoT

Abstract

Within the past decade, the number of IoT devices introduced in the market has increased dramatically. The total is approaching a staggering 15 billion, meaning that there are currently roughly two connected devices per living human. This trend is expected to continue at a rapid pace, with an estimated 50 billion connected devices by the year 2020. However, the massive deployment of IoT devices has led to significant security and privacy concerns given that security is often treated as an afterthought for IoT systems. Security issues may come at different levels, from deployment issues that leave devices exposed to the internet with default credentials, to implementation issues where manufacturers incorrectly employ existing protocols or develop proprietary ones for communications that have not been examined for their sanity. While existing cybersecurity and network security solutions can help protect IoT, they often suffer from the limited on-board/on-chip resources. To mitigate this problem, researchers have developed multiple solutions based on a top-down (relying on cloud for IoT data processing and authentication) or a bottom-up (leveraging hardware modifications for efficient cybersecurity protection). In this talk, I will first introduce the emerging security and privacy challenges in the IoT domain. I will then focus on the bottom-up solutions on IoT protection and will present our recent research effort in microarchitecture supported IoT runtime attack detection and device attestation. The developed methods will lead to a design-for-security flow towards trusted IoT and their applications. I will also introduce our educational and outreach activities in IoT design and security.

Short Biography

Yier Jin is the Endowed IoT Term Professor in the Warren B. Nelms Institute for the Connected World and also an Associate Professor in the Department of Electrical and Computer Engineering (ECE) in the University of Florida (UF). Prior to joining UF, he was an assistant professor in the ECE Department at the University of Central Florida (UCF). He received his PhD degree in Electrical Engineering in 2012 from Yale University after he got the B.S. and M.S. degrees in Electrical Engineering from Zhejiang University, China, in 2005 and 2007, respectively. His research focuses on the areas of embedded systems design and security, trusted hardware intellectual property (IP) cores and hardware-software co-design for modern computing systems. His is currently focusing on the design and security analysis on Internet of Things (IoT) and wearable devices with particular emphasis on information integrity and privacy protection in the IoT era. Dr. Jin received the Best Paper Award in the 52nd Design Automation Conference in 2015, the 21st Asia and South Pacific Design Automation Conference in 2016, and the 10th IEEE Symposium on Hardware-Oriented Security and Trust in 2017.